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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/988,417	11/16/2001	Ralf Bohnke	282452US8X	8530
22850	7590	11/01/2007		
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER KIM, KEVIN	
			ART UNIT 2611	PAPER NUMBER
			NOTIFICATION DATE 11/01/2007	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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## Office Action Summary

Application No.

09/988,417

Applicant(s)

BOHNKE ET AL.

Examiner

Kevin Y. Kim

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 July 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2-15, 17-20 and 24-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2-4, 9-13 and 17 is/are allowed.
- 6) ☒ Claim(s) 5-8, 14, 15, 18-20 and 24-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed July 20, 2007 have been fully considered but they are not persuasive.

Applicant argues that the Espax patent teaches away from the Applicant's claimed advancements because the patent teaches adjusting the sub-carriers in the probed sub-bands as opposed to applying a weighting value to each of the subcarriers. However, it appears that the patented method is more advanced than the patent provide a more elaborate way to adjust subcarriers identified poor instead of a wholesale approach of weight applying to all the subcarriers. In other words, the patent attempts to avoid to apply weights to all the subcarriers when most of the subcarriers do not need adjustments. As addressed in the previous Office action, one skilled in the art would have faced a trade-off between determining weights to all the subcarriers, which results in better communication at the expense of calculating the weights for subcarriers that are of quality, and determining weights on selected subcarriers. Although the Espax patent teaches adjusting the sub-carriers in the probed sub-bands, it is not believed that it discourages determining weights to all the subcarriers because the latter approach also provides more precise subcarrier adjustments albeit the complexity adjusting weights on all the subcarriers commonly in the order of hundreds.

### ***Claim Rejections - 35 USC § 103***

2. Claims 24-28, 5-7,14,18,20 are rejected under 35 U.S.C. 103(a) as obvious over Espax et al (US 6,373,433 previously cited).

Claim 24.

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Expax et al discloses a method for transmitting OFDM symbols by using a plurality of OFDM subcarriers in an OFDM transmission system (see col.4, lines 25-35), comprising the steps of:

generating the OFDM signals to be transmitted by using a plurality of antenna elements (4,5,6),

obtaining channel response vectors corresponding to the plurality of antenna elements, wherein each of the channel response vectors includes subcarrier related elements corresponding to a selected set of subcarriers (see col.5, lines 43-45, 61-63 and 65-67 in particular), and

applying weighting value to each of said selected of subcarriers in accordance with a complex conjugate of the channel response vectors. See col. 6, lines 20-25.

It should be noted that since not all the sub-carriers are processed the transmitted signal quality after weight adjustment can not be as best as it could be, although the transmission overhead is reduced. Thus, it would have been obvious to one skilled in the art at the time the invention was made to measure the frequency response of all of the plurality of sub-carriers and apply appropriate weights to the plurality of the sub-carriers in accordance with a complex conjugate of the channel response vectors in order to increase the transmission signal quality. See col. 6, lines 55-58.

Claims 25 and 26.

Espax et al discloses a method and apparatus for transmitting an orthogonal frequency division multiplex (OFDM) signal by using a plurality of antenna elements (4,5,6) at a base station (1) in a wireless transmission system, wherein the OFDM signal comprises a plurality of subcarriers, comprising:

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detecting frequency channel characteristics of each subcarrier of the OFDM signal for each of said plurality of antenna elements (see col. 5, lines 61-63),

adjusting at least one of the amplitude and phase of each subcarrier in accordance with the detected characteristics of a selected set of subcarriers (see col. 6, lines 23-24 and note that, although a weight adjustment for a sub-band comprising of a plurality of sub-carriers is taught as preferable because of low overhead, this description effectively describes an embodiment, albeit less desirable, applying weights to respective sub-carriers individually), and

transmitting the OFDM signal by using the adjusted subcarriers via said plurality of antenna elements.

It is obvious that since not all the sub-carriers are processed the transmitted signal quality after weight adjustment can not be as best as it could be, although the transmission overhead is reduced. Thus, it would have been obvious to one skilled in the art at the time the invention was made to measure the frequency response of all of the plurality of sub-carriers and apply appropriate weights to the plurality of the sub-carriers in accordance with a complex conjugate of the channel response vectors in order to increase the transmission signal quality. See col. 6, lines 55-58.

Further respect to claim 26 requiring the same transmission device detecting the channel characteristics of the sub-carriers, as opposed at the receiving device, it is well known in the art that the channel characteristics can be measured at either transmitting or receiving device since they produce the same result in many circumstances.

Claims 27 and 28.

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The detected frequency characteristics are subcarrier channel response vectors. See col.5, lines 65-67.

Claims 5 and 18.

The phase of each of sub-carriers could be adjusted in response to detected frequency channel characteristics since the applied weights affect both the gain (in turn, amplitude) and phase. See col. 5, lines 43-45.

Claim 6.

The application of weights to respective antennas amounts to selecting an antenna having the best channel characteristics since antennas with highly poor channel characteristics would not be used.

Claim 7.

The application of weights to respective antennas amounts to distributing power of the transmission signal to all of the plurality of antenna elements since the weights include the amplitude gain adjustment.

Claim 14.

Espax et al teaches probing signals, i.e., "pilot symbols," for determining channel response.

Claim 20.

The transmitter (1) reads on the base station.

5. Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Espax et al, as applied to claims 25 and 26 above respectively, in view of Minami et al (US 6,587,510 previously cited).

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Espax et al discloses all the subject matter claimed, as explained above, but for limiting an adjustment of the magnitude of the subcarrier signal to an upper threshold.

Minami et al teaches limiting the adjustment of transmission power to an upper threshold for the purpose of maintaining a proper carrier to interference ratio. See col. 6, lines 15-25.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to limit an adjustment of the magnitude of the subcarrier signal to an upper threshold when the amplitude is adjusted in response to detected channel characteristics in the system of Espax et al for the purpose of maintaining a proper carrier to interference ratio, as taught by Minami et al.

6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Espax et al, as applied to claim 25 above, in view of Ocenasek et al (US 6,674,324 cited previously).

Espax discloses all the subject matter claimed, as explained above, but for a computer software program configured to implement the method defined in claim 25 when run on a computing device of a transmitting device. However, a software implementation of a method performed by a hardware, using a program and a computer, is notoriously well known in the art, as evidenced by Ocenasek et al describing a device in the same field of endeavor (see col. 15, lines 35-44) and thus would have been obvious to one skilled in the art at the time the invention was made as an alternative implementation.

#### ***Allowable Subject Matter***

7. Claims 2-4,9-13 and 17 are allowed.

#### ***Conclusion***

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3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Y. Kim whose telephone number is 571-272-3039. The examiner can normally be reached on 8AM --5PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

October 29, 2007

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KEVIN KIM  
PRIMARY PATENT EXAMINER

Handwritten signature of Kevin Kim in cursive script.